

In the Specification:

On page 1 after the title and before paragraph 0001, insert the following new paragraphs and headings as follows:

Applicants claim, under 35 U.S.C. §§ 120 and 365, the benefit of priority of the filing date of April 6, 2005 of a Patent Cooperation Treaty patent application, copy attached, Serial Number PCT/EP2005/003586, filed on the aforementioned date, the entire contents of which are incorporated herein by reference, wherein Patent Cooperation Treaty patent application Serial Number PCT/EP2005/003586 was not published under PCT Article 21(2) in English.

Applicants claim, under 35 U.S.C. § 119, the benefit of priority of 1) the filing date of May 18, 2004 of a German patent application, copy attached, Serial Number 10 2004 025 192.4, filed on the aforementioned date, and 2) the filing date of March 23, 2005 of a German patent application, copy attached, Serial Number 10 2005 013 364.9, filed on the aforementioned date, the entire contents of each of which are incorporated herein by reference.

Background of the Invention

Field of the Invention

Replace paragraph 0001 with the following paragraph:

The present invention relates to a position measuring system for determining the position of two structural components which are movable in relation to each other ~~in accordance with the preamble of claim 1.~~

Replace paragraph 0002 with the following paragraph:

Such a position measuring system includes ~~comprises~~ a first support for receiving a

position measuring device, such as a scale graduation, of the position measuring system, which is set up and provided for being fastened to one of the two structural components, as well as a second support for receiving a position measuring device, such as a scanning unit, of the position measuring system, which is set up and provided for being fastened to the other one of the two structural components which are movable with respect to each other, and furthermore connectors ~~connecting means~~ for fastening the two supports on the respectively assigned structural component. At least one of the connectors includes said ~~connecting means comprises~~ a nut and an associated screw, wherein the latter can be inserted into a recess of the support assigned to the connector ~~connecting means~~.

Replace paragraph 0004 with the following heading and paragraph:

Description of the Related Art

In particular, the position measuring system can be a so-called linear measuring system which has a linear scale and the scanning unit has a scanning head (arranged on a scanning carriage), which scans the scale. In this case the first support of the position measuring system is a longitudinally extending housing as a rule, in which the linear scale is fixedly housed and the scanning carriage can be longitudinally displaced, and the second support is a mounting base, which is connected with the scanning carriage, i.e. can be displaced together with it in the extension direction. Because the housing on the one hand and mounting base on the other hand are respectively connected with one of two structural components of a machine, in particular a machine tool, which can be shifted with respect to each other, it is possible by ~~means of~~ the linear measuring system to detect a relative movement of the two structural components with respect to each other, which corresponds to a relative movement of the mounting base with respect to the housing, and therefore of

the scanning head with respect to the linear scale, and its amount can be precisely determined.

Replace paragraph 0006 with the following heading and paragraph:

SUMMARY AND OBJECTS OF THE INVENTION

Therefore ~~an~~ the object of the present invention is based on providing a position measuring system of the type mentioned at the outset, with which the installation in a machine to be equipped with the measuring system is made easier.

Replace paragraph 0007 with the following paragraph:

This object is attained in accordance with the present invention by ~~means of the~~ creation of a position measuring system ~~having the characteristics of claim 1 for~~ determining the position of a first structural component and a second structural component. The position measuring system includes a first support for receiving a first position measuring device, which is set up and provided for being fastened to the first structural component and a second support for receiving a second position measuring device, which is set up and provided for being fastened to the second structural component. The position measuring system further includes a first connector that fastens the first support to the first structural component and a second connector that fastens the second support to the second structural component, wherein the second connector includes a nut, with which a screw can be brought into engagement, wherein the nut is inserted into a recess of the second support. The position measuring system further includes a blocking element which, in an inserted state, works together with the nut in order to prevent a movement of the nut out of the recess in an axial direction, which is a direction of insertion of the screw into the nut, sufficiently far so that insertion of the screw into the nut is made possible.

Replace paragraph 0008 with the following paragraph:

The attainment of the object of the present invention mentioned previously makes a blocking element available in a ~~by~~ cost-effective manner ~~means~~, which secures the nut inserted into the associated recess against falling out in the axial direction (with respect to the direction of extension of the screw to be turned into the nut or substantially perpendicular to the opening of the nut).

Replace paragraph 0012 with the following paragraph:

In accordance with a preferred embodiment of the present invention a clip is arranged substantially within the recess and in particular is fixed on it inside of the recess. In this connection the fixation in place of the clip advantageously takes place against an encircling interior wall of the recess, which projects away from the bottom surface of the recess and defines the opening to be covered or closed by the clip on the side facing away from the bottom surface. The ~~said~~ interior wall of the recess does not absolutely have to be completely encircling, instead it can also have one or several interruptions in the circumferential direction. It is of importance that the interior wall of the recess encloses the outer edge of the clip at least partially.

Replace paragraph 0014 with the following paragraph:

In accordance with an embodiment of the present invention, the clip has at least two sections which are angled off the contact face for the nut, which preferably extend parallel to respective sections of the (encircling) interior wall of the recess, wherein at least one tongue has been formed out of the respective angled-off section of the clip and acts with an edge on the interior wall of the recess. In this case the action of the sharp edges of the tongues on the interior wall of the recess takes place opposite the direction along which

the clip can be moved out of the recess, so that the clip is fixed in place against the interior wall in the axial direction.

Replace paragraph 0015 with the following paragraph:

In accordance with another embodiment of the present invention, the base body of the clip which includes ~~constitutes~~ the contact face for the nut and extends perpendicularly with respect to the encircling interior wall of the recess can be elastically deformed in such a way that it rests with at least one edge, preferably several edges of its (encircling) outer rim against the interior wall of the recess under prestress.

Replace paragraph 0017 with the following paragraph:

In accordance with a further embodiment of the present invention, the clip is fixed in a positively connected manner, in particular in the form of a snap-in connection, with the interior wall of the recess. It is possible to this end to provide (form) snap-in hooks, for example, on the clip, which engage corresponding undercuts in the interior wall of the recess. On the other hand it is possible to provide (form) one or several protrusions on the clip, which engage associated holes in the interior wall of the recess.

Replace paragraph 0018 with the following paragraph:

In accordance with an advantageous further development of the present invention the clip has an elongated hole in its base body being used as the contact face for the nut, which can be engaged by the screw associated with the nut with its free end projecting from the nut. By ~~means of~~ this it is achieved that the screw can be shifted together with the nut perpendicularly with respect to the axial direction for compensating manufacturing or assembly tolerances.

Replace paragraph 0020 with the following paragraph:

Alternatively it is also possible to integrate a corresponding twisting guard into the clip in that it extends around the nut in a positively connected manner, for example by ~~means of~~ legs provided on the clip. In this case it is necessary in turn to fix the clip secure against twisting (positively connected) in the recess.

Replace paragraph 0021 with the following paragraph:

Further details and advantages of the present invention will become apparent in the course of the following description of exemplary embodiments by ~~means of~~ the drawing figures.

Replace paragraph 0023 with the following heading and paragraph:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1[[,]] is a schematic cross-sectional view of an embodiment of a position measuring system in the form of a linear measuring system[[,]] in accordance with the present invention;

Replace paragraph 0024 with the following paragraph:

FIG. 2a[[,]] is a perspective detail representation of the position measuring system in FIG. 1 with an embodiment of a recess, in which an embodiment of a nut used for fastening the position measuring system to a machine part is received[[,]] in accordance with the present invention;

Replace paragraph 0025 with the following paragraph:

FIG. 2b[[,]] is a rear plan view of the recess in FIG. 2a[[,]];

Replace paragraph 0026 with the following paragraph:

FIG. 3a[[,]] is a perspective representation of a first exemplary embodiment of a

blocking element in the form of a clip for securing the nut in the recess in accordance with FIG. 2a[[],] in accordance with the present invention;

Replace paragraph 0027 with the following paragraph:

FIG. 3b, a perspective view from above on the clip in accordance with FIG. 3a following the insertion into a recess in accordance with FIG. 2a[[],];

Replace paragraph 0028 with the following paragraph:

FIG. 3c[[],] is a partially broken-open perspective representation of the arrangement in FIG. 3a[[],];

Replace paragraph 0029 with the following paragraph:

FIG. 4a[[],] shows a second exemplary embodiment of a clip which can be employed for the axial securing of a nut in the recess in accordance with FIG. 2a[[],]in accordance with the present invention;

Replace paragraph 0030 with the following paragraph:

FIG. 4b[[],] shows the clip in FIG. 4a in the arched state[[],];

Replace paragraph 0031 with the following paragraph:

FIG. 4c[[],] is a perspective view from above on the clip from FIG. 4a following the insertion into a recess in accordance with FIG. 2a[[],];

Replace paragraph 0032 with the following paragraph:

FIG. 4d[[],] is a partially broken-open perspective representation of the arrangement in FIG. 4c[[],];

Replace paragraph 0033 with the following paragraph:

FIG. 5a[[,]] shows a third exemplary embodiment of a clip which can be employed for the axial securing of a nut in the recess in accordance with FIG. 2a[[,]] in accordance with the present invention;

Replace paragraph 0034 with the following paragraph:

FIG. 5b[[,]] is a perspective view from above on the clip from FIG. 2a with the clip in accordance with FIG. 5a placed on it[[,]];

Replace paragraph 0035 with the following paragraph:

FIG. 5c[[,]] is a partially broken-open perspective representation of the arrangement in FIG. 5b[,];

Replace paragraph 0036 with the following paragraph:

FIG. 6a[[,]] shows a fourth exemplary embodiment of a clip which can be employed for the axial securing of a nut in the recess in accordance with FIG. 2a[[,]] in accordance with the present invention;

Replace paragraph 0037 with the following paragraph:

FIG. 6b[[,]] is a partially broken-open perspective representation of the clip in FIG. 6a in the recess in FIG. 2a[[,]];

Replace paragraph 0038 with the following paragraph:

FIG. 7a[[,]] shows a fifth exemplary embodiment of a clip which can be employed for the axial securing of a nut in the recess in accordance with FIG. 7a[[,]] 2a in accordance with the present invention;

Replace paragraph 0039 with the following paragraph:

FIG. 7b[[,]] is a partially broken-open perspective representation of the clip in FIG. 7a following its placement into the recess in accordance with FIG. 2a[[,]] ;

Replace paragraph 0040 with the following paragraph:

FIG. 8[[,]] shows an exemplary embodiment wherein ~~the~~ an embodiment of a blocking element is an O-ring inserted into an embodiment of a ~~the~~ nut[[,]];

Replace paragraph 0041 with the following paragraph:

FIG. 9[[,]] shows an exemplary embodiment wherein an embodiment of a ~~the~~ blocking element is an elastic coating on an embodiment of a ~~the~~ nut[[,]];

Replace paragraph 0042 with the following paragraph:

FIG. 10[[,]] shows an exemplary embodiment wherein an embodiment of a ~~the~~ blocking element is an O-ring inserted into an embodiment of a ~~the~~ recess[[,]]; and

Replace paragraph 0043 with the following paragraph:

FIG. 11[[,]] shows a representation along the line A - A of the exemplary embodiment in FIG. 10.

Between paragraphs 0043 and 0044 insert the following heading:

DESCRIPTION OF THE PREFERRED EMBODIMENT(S) OF THE INVENTION

Replace paragraph 0045 with the following paragraph:

The linear measuring system includes a position measuring device such as a ~~comprises~~ a linear scale L arranged in a hollow space H of a housing G extending in the longitudinal direction E of the scale L, as well as a second position measuring device such as a scanning unit that includes ~~constituted by~~ a scanning head K arranged on a scanning carriage W for scanning a measuring graduation applied to the scale L. The measuring graduation is arranged to be displaceable in relation to the linear scale L in the direction E of its extension in the hollow space H of the housing G and is connected with a mounting base F. The mounting base F on the one hand and the housing G on the other are

respectively connected by suitable connectors ~~connecting means~~ M, S or V with the assigned structural component B1 or B2 of the machine tool.

Replace paragraph 0046 with the following paragraph:

The connectors ~~connecting means~~ provided at the mounting base F and used for connecting it with a structural component B1 of the machine tool include ~~are comprised of~~ a screw S extending respectively through an opening in the mounting base F on the one hand and the corresponding structural components B1 of the machine tool on the other hand, as well as a nut M, whose interior thread is engaged by the exterior thread of the screw S and which is seated in a recess 100 of the mounting base F.

Replace paragraph 0052 with the following paragraph:

FIG. 3a shows a first exemplary embodiment of a blocking element in the form of a clip 1, which can be pushed into the recess 100 of the mounting base F, and by ~~means of~~ which the nut M can be secured against axially falling out of the recess 100 of the mounting base F, wherein the movement of the nut M perpendicularly with respect to the axial direction (the direction of insertion of the screw S into the nut M), i.e. along the direction E of extension of the position measuring system, is simultaneously not hampered.

Replace paragraph 0057 with the following paragraph:

By ~~means of~~ FIG. 3c it can be seen that the thickness d of the nut M is less than the distance a of the base body 10 of the clip 1, which is used as the contact face, from the bottom surface 115 of the recess 100. Because of this the nut M is seated with axial play in the recess 100, at least prior to the screw S being tightened, so that it can be shifted for the purpose of tolerance compensation along the direction E of extension of the position measuring system (i.e. perpendicularly with respect to the axial extension of the screw S).

Such a shifting movement can easily be followed by the screw S, since it passes through an elongated hole 115a extending in the bottom surface 115 of the recess 100 in the direction E of extension.

Replace paragraph 0058 with the following paragraph:

The clip 1 represented by ~~means of~~ FIGS. 3a to 3c has the advantage that it can be inserted as a self-maintained insertion element into common recesses 100 of a mounting base F without it being necessary to specially design the wall of the recess 100, formed by the bottom surface 115 and the interior wall 116, for fixing the clip 1 in place. Instead, the fixation in place of the clip 1 in the recess 100 is solely achieved by ~~means of~~ the design of the clip 1 with sharp-edged sections 118, which can dig into the encircling interior wall 116 of the recess 100. Based on the spring- elastic embodiment of the angled-off legs 116 and the tongues 117, it is possible here to compensate greater tolerances with respect to the exterior dimensions of the clip 1, on the one hand and, on the other, the interior dimensions of the recess 100. Moreover, the mobility of the nut M for purposes of tolerance compensation is practically not affected in comparison with an arrangement without a clip.

Replace paragraph 0059 with the following paragraph:

FIG. 4a shows a second exemplary embodiment of a clip 2, which is preferably made of a spring plate and includes ~~consists of~~ a base body 20 with a polygonal (hexagonal) outer contour 21, which is provided on the one hand with an elongated hole 25, and on the other hand with sharp-edged sections 28 along the outer contour 21. Because of its elastic design, the clip 2 can be easily arched by bending it with an appropriate force, see FIG. 4b.

Replace paragraph 0060 with the following paragraph:

The clip 2 is designed in such a way that it has a slightly greater extension in one direction, preferably along the direction E of extension of the position measuring system, than the recess 100, see FIGS. 4c and 4d. Because of this, forces at the edges act on the outer contour 21 of the base body 20 when fitting (pressing in) the clip 2 into the recess 100 of the mounting base F, which act counter to the insertion of the clip into the recess. Because of forces simultaneously acting in the joining direction R on the clip 2 in the course of pressing in/inserting the clip 2, its base body 20 arches because of being bent, as represented in FIGS. 4c and 4d, wherein the effective length of the base body 20 of the clip 2 is slightly reduced in the direction E of extension, so that the clip 2 can be pushed further into the recess 100 ~~[[1]]~~. As a result, in the arched state the sharp-edged sections 28 of the outer contour of the clip ~~[[1]]~~ 2 then rest against the interior wall 116 of the recess 100, so that they are axially fixed in place in the recess 100.

Replace paragraph 0062 with the following paragraph:

In comparison with the clip shown in FIGS. 3a to 3c, the clip 2 described by ~~means of~~ FIGS. 4a to ~~4b~~ 4d is in particular distinguished by its simple design. But it must be more accurately matched to the inner contour 111 of the recess 100 with respect to its exterior dimensions, i.e. the design of the outer contour 21, because the possibilities for compensating larger tolerances in the mentioned dimensions ensuing from the use of angled resilient legs no longer apply.

Replace paragraph 0065 with the following paragraph:

Otherwise the exemplary embodiment represented by ~~means of~~ FIGS. 5a to 5c agrees, in particular in regard to the function of the clip 3, with those already represented

by ~~means of~~ FIGS. 3a to 3c and 4a to 4d, so that for further details reference is made to the respective explanations.

Replace paragraph 0066 with the following paragraph:

Regarding its particular advantages, the clip represented in FIGS. 5a to 5c corresponds to the one shown in FIGS. 4a to 4d, since this is also a flat sheet metal element which can be produced simply and cost-effectively, for which attention must be paid to the matching of the outer contour 31 of the clip ~~[[1]]~~ 3 to the inner contour 111 of the recess 100.

Replace paragraph 0068 with the following paragraph:

The clip shown in FIGS. 6a and 6b can also be advantageously designed as a plastic part, because no sharp-edged sections of the outer contour 41 are needed for providing the snap-in connection with the interior wall 116 of the recess 100, since this is provided by the snap-in protrusions 49 snapping into the associated undercuts 119. The clip 4 can therefore be produced in a cost-efficient manner by injection molding (as injection-molded element), wherein simultaneously larger tolerances regarding the outer dimensions of the clip 4 on the one hand and, on the other, the inner dimensions of the recess 100, can be compensated by ~~means of~~ the spring-elastic design of the snap-in hooks 46.

Replace paragraph 0071 with the following paragraph:

The latter also applies to the clip 5 represented in FIGS. 7a and 7b, which again can be an injection-molded element made cost-effectively of plastic. This includes ~~comprises~~ a flat base body 50 delimited by a polygonal (hexagonal) outer contour 51 with an elongated hole 55, from which two pins 53 provided with ribs 54 extend perpendicularly.

Corresponding holes 113 in the form of bores in the vicinity of the recess 100 are associated with the pins 53, into which the pins 53 can be inserted and wherein the ribs 54 press against the outer walls of the bores 113 and in this way provide a dependable fixation of the clip 5 by ~~means of~~ the engagement of the pins 53 with the associated bores 113.

Replace paragraph 0072 with the following paragraph:

In comparison with the clip 4 represented by ~~means of~~ FIGS. 6a and 6b, which can also be produced as an injection-molded part, the clip 5 represented in FIGS. 7a and 7b, which can be fixed in place on the recess 100 by ~~means of~~ a plug connection, is primarily distinguished in that the amount of a tolerance compensation is not diminished by a displacement of the nut M in the recess 100 in a direction E of extension of the position measuring system. However, here additional working of the material in the vicinity of the recess 100 is required for creating suitable holes 113 for receiving the pins 53.

Replace paragraph 0073 with the following paragraph:

Otherwise the clips 4, 5 described by ~~means of~~ FIGS. 6a and 6b, as well as FIGS. 7A and 7b, match the clips 1, 2, 3 explained by ~~means of~~ FIGS. 3a to 3c, 4a to 4d and 5a to 5c, in particular with respect to their functioning, so that reference is made to the respective descriptions for further details.

Replace paragraph 0074 with the following paragraph:

FIGS. 8 and 9 show two embodiments in which the nut M is secured against axially falling out of the recess 100 by clamping it circumferentially in the recess 100. In this case it is particularly advantageous that the blocking element 6, 7 is arranged between the nut M and the interior wall 116 of the recess 100 and is an elastically yielding element made of a resiliently yielding material, for example plastic.

Replace paragraph 0075 with the following paragraph:

In FIG. 8 a groove 121 has been cut over the circumference of the nut M. In accordance with FIG. 9, the blocking element is an elastically yielding element, such as coating 7 applied to the outer circumference of the nut M. This coating can be provided by vulcanization, for example.

After paragraph 0080 insert the following paragraph:

The invention may be embodied in other forms than those specifically disclosed herein without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive, and the scope of the invention is commensurate with the appended claims rather than the foregoing description.

Replace the paragraph beginning at page 18, line 1, with the following paragraph:

~~Claims~~ We Claim:

After page 23 add a new page 24 to read as follows:

Abstract of the Disclosure

A position measuring system for determining the position of a first structural component and a second structural component. The position measuring system includes a first support for receiving a first position measuring device, which is set up and provided for being fastened to the first structural component and a second support for receiving a second position measuring device, which is set up and provided for being fastened to the second structural component. The position measuring system further includes a first connector that fastens the first support to the first structural component and a second connector that fastens the second support to the second structural component, wherein the

second connector includes a nut, with which a screw can be brought into engagement, wherein the nut is inserted into a recess of the second support. The position measuring system further includes a blocking element which, in an inserted state, works together with the nut in order to prevent a movement of the nut out of the recess in an axial direction, , which is the direction of insertion of said screw into said nut, sufficiently far so that insertion of the screw into the nut is made possible.